
**QUALITY ASSURANCE
PROJECT PLAN**

Version 1.0

Hammond, Indiana, Semi-Continuous Ambient Metals Monitoring

Prepared by:

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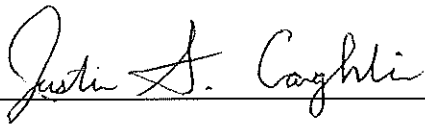
October 16, 2018

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SECTION A – PROJECT MANAGEMENT

A.1 Title of Plan and Approval


Quality Assurance Project Plan
Hammond, Indiana
Semi-Continuous Ambient
Metals Monitoring

 Date: 10/16/2018

Justin Coughlin, US EPA Region 5, Project Manager

 Date: 10/16/18

Scott Hamilton, US EPA Region 5, Field Operations Manager

 Date: 10/16/18
Bilal Qazzaz, US EPA Region 5, Air and Radiation Division Quality Assurance Coordinator

 Date: 10/16/18

Michael Compher, US EPA Region 5, Air Monitoring & Analysis Section Chief

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A.3 Distribution List

Justin Coughlin, US EPA Region 5

Scott Hamilton, US EPA Region 5

Bilal Qazzaz, US EPA Region 5

Michael Compher, US EPA Region 5

Eileen Furey, US EPA Region 5

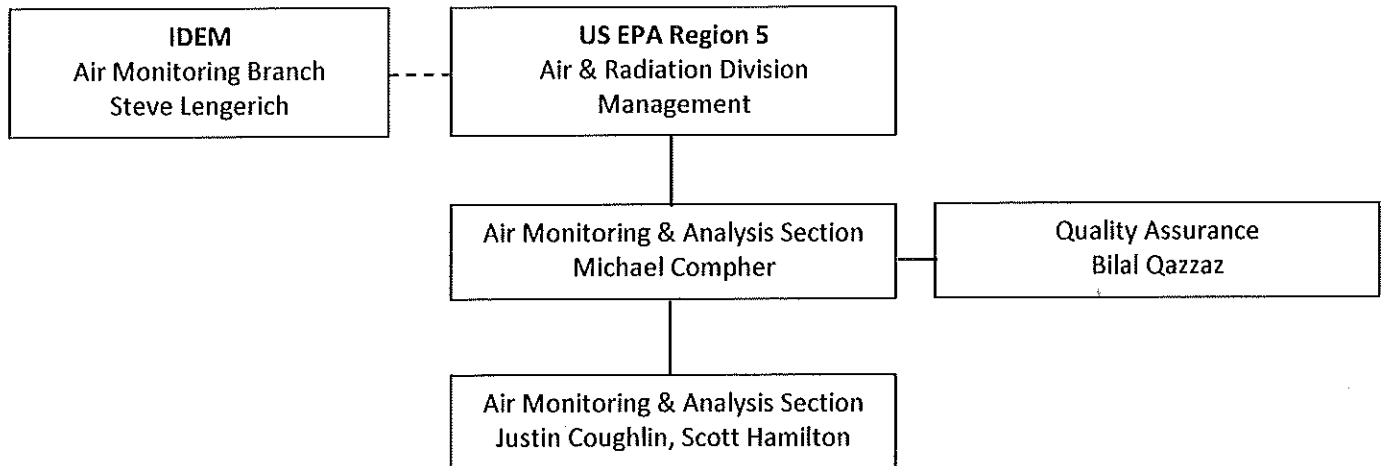
Steve Lengerich, Indiana Department of Environmental Management

A.4 Project/Task Organization

Table A.1 Roles & Responsibilities

Individual(s) Assigned	Responsible for:	Authorized to:
Justin Coughlin	<ul style="list-style-type: none"> Overall project management Reporting to management QAPP creation/revisions, data analysis, writing study report 	<ul style="list-style-type: none"> Direct the implementation of the study according to the QAPP Communicate findings to EPA, IDEM, and other relevant stakeholders Operate monitoring site Collect data
Scott Hamilton	<ul style="list-style-type: none"> QAPP Review Overall field operations Equipment repair and quality control Standard Operating Procedures Report to Project Manager 	<ul style="list-style-type: none"> Operate monitoring site Collect data Communicate with Hammond Sanitary District and IDEM concerning site operations
Bilal Qazzaz	<ul style="list-style-type: none"> QAPP review Data validation 	<ul style="list-style-type: none"> Determine whether DQOs are met
Michael Compher	<ul style="list-style-type: none"> QAPP review Oversight of all staff involved in project Work with US EPA Region 5 Office of Public Affairs on communication products 	<ul style="list-style-type: none"> Determine the beginning and end of project work Approve communications products with input from other higher level ARD management

Figure A.1 Organization Chart



A.5 Problem Definition and Background

Indiana Department of Environmental Management (IDEM) installed and began operation of two Pb-Total Suspended Particulate (TSP) monitors directly adjacent to the Whiting Metals LLC facility located in Hammond, Indiana in August 2018. The state agency operates two Tisch Environmental, Inc. TSP monitors that are collecting filter samples on the EPA-scheduled routine 1-in-3 day schedule, collectively. Whiting Metals LLC is a stationary secondary nonferrous metals plant located at 2230 Indianapolis Boulevard, Hammond, Indiana.

In addition, US EPA's Superfund Division is currently conducting cleanup activity in the area due to local soil contamination from a historic smelter facility located at 2230 Indianapolis Boulevard, previously known as Federated Metals Corporation. More highly time resolved data is needed to better distinguish between the local metals facility emissions and cleanup activities contributing to elevated Pb and potentially other toxic metals in ambient air. The location of EPA's trailer containing EPA's monitor is shown on Figure A.2; the monitor will be at the same location as IDEM's two Pb monitors, which are directly adjacent to the Whiting Metals LLC facility.

Figure A.2 Study Area Map

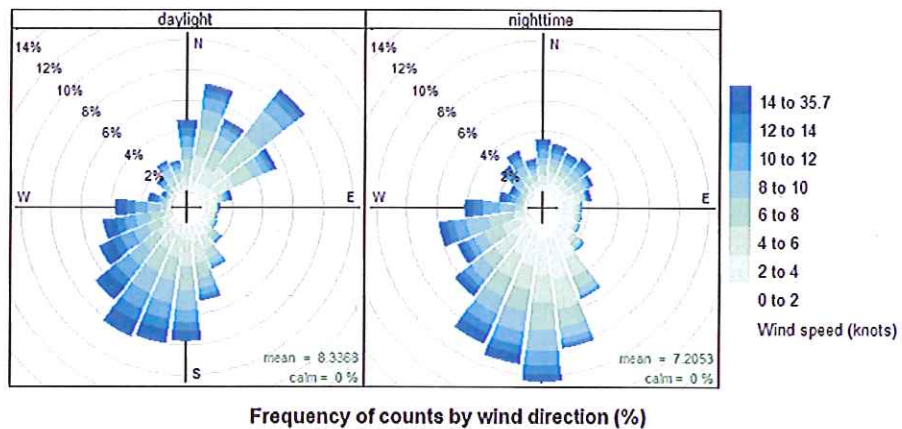


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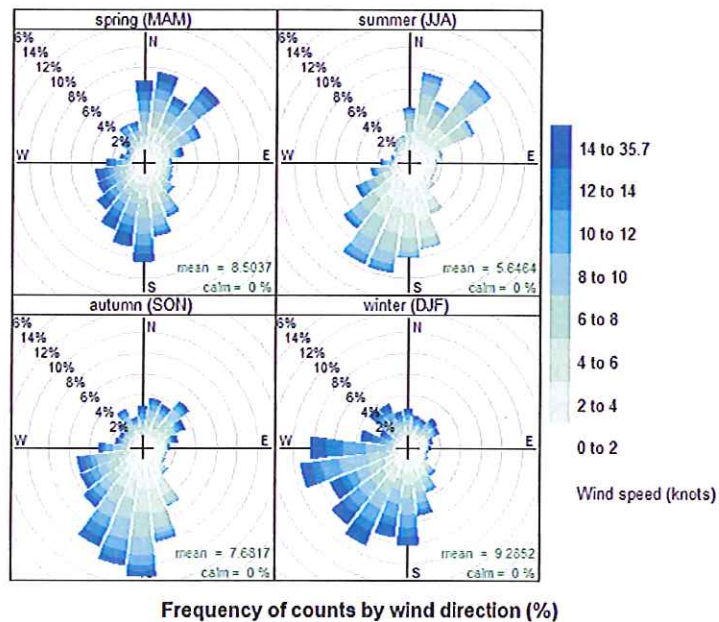
Below on Figure A.3 are wind roses produced using hourly meteorological data from a nearby IDEM monitoring site (Gary, IN; 18-089-0022) over the course of 01/01/2012 to 01/01/2018. Both time of day and seasonal wind trends are shown. Winds are predominantly from the southwest, but during spring and summer months can come from the northeast. During autumn and winter months, winds are predominantly from the southwest. The Xact and IDEM monitoring sites in Figure A.2 are expected to be downwind of the target source (i.e., Whiting Metals LLC) during the study.

Figure A.3 Gary, IN wind roses from 01/01/2012 to 01/01/2018 differentiated by a) time of day and b) season.

a)



b)



A.6 Project/Task Description

For at least two months, Semi-Continuous metals monitoring will allow characterization of ambient concentrations of toxic metals in the community. The Xact Fenceline Monitor provides TSP or PM₁₀ fraction concentrations in 15-minute, 30-minute, 1, 2, 3, or 4-hour increments for 23 metals and trace elements via built-in, nondestructive, X-ray Fluorescence (XRF) analysis. The metals monitor is collocated with a meteorological station. After the conclusion of the two months of sampling, US EPA Region 5 will assess whether Semi-Continuous monitoring should continue beyond two months. Subsequent monitoring following the two months of sampling will continue to follow the QA procedures outlined within this QAPP.

A.7 Quality Objectives & Criteria

The main objective of this monitoring project is to determine if ambient Pb concentration levels are above the NAAQS and toxic metals are above acute and chronic health benchmarks. Hourly metals and meteorological data will be used together to identify the contributing source(s) of toxic metals in ambient air. A focus of data analysis will be to discern which local sources are contributing to elevated Pb concentrations in the community.

Quantitative performance of the metals monitor will be assessed by comparison to well-established reference sampling and analytical methods. To assure that those methods provide data of sufficient quality for a robust evaluation of metals monitor performance, accuracy data quality indicators (DQIs) have been established for the reference sampler flow rate and for the analytical method. The DQIs were established to ensure that data used to support the quantitative performance evaluations of the Xact 625 metals monitor are of sufficient quality. Specifically, the measurement quality objectives (MQOs) were developed using the manufacturers recommendations in the Xact 625 Manual version 625-00010-00 REV P4 5/29/2015. The MQO for the reference sampler flow rate is that it be within $\pm 5\%$ of the target flow rate for the sampler. The MQO for the analytical accuracy is that reported metals concentrations be within $\pm 10\%$ of the true value, on average (i.e., quality control checks). The degree of attainment of these DQIs will be assessed by means of PE verifications conducted during the testing. The procedures and schedule for the PE verifications are described in Section C1.

If the following criteria are met, the hourly metals data will be considered of sufficient quantity and quality:

- (1) Data completeness is 75%, or 18 samples, over a 24-hour period;
- (2) Measurements are above MDLs for toxic metals, which can be found in Appendix A "Xact 625 Ambient Metals Monitor Operation Manual"
- (3) The measurement quality objectives are met for the sampler flow rate and analytical accuracy of the metals concentration.

A.8 Special Training/Certification

Personnel working on this monitoring system must meet minimum training requirements for safety and technical expertise. Minimum safety training shall include US EPA's twenty-four hour health and safety training, including an eight-hour annual refresher training. Minimum technical training shall include at least

two years of prior experience in the field of ambient air monitoring and onsite hands-on training with the Project Manager or the field operations manager.

A.9 Documents and Records

The Project Manager will have responsibility to ensure all QAPP revisions are shared with project participants. Each revision of the QAPP will be numbered by sequential version number and dated.

A site notebook will be kept at the monitoring station. The notebook will contain the appropriate data forms for routine operations as well as inspection and maintenance forms and SOPs. At a minimum, the site operator will document all field activities according to the Xact SOP.

Electronic data collection – To reduce the potential for data entry errors, an automated datalogging system will be utilized where appropriate and will record the same information that would be found on data entry forms.

This QAPP, the Xact SOP, and the Xact Operations manual will be kept in the monitoring shelter at all times or will be available electronically.

The Project Manager will create a database for the sample results which will be used during data analysis. This database will be archived and retained for 5 years. The data repository directory for all data is: Environmental Protection Agency (EPA)\Air Monitoring and Analysis Section (AMAS) - Documents\Xact\Whiting Metals.

The Project Manager will write all data reports, which will: 1) summarize the details of the samples collected, 2) the results of the analysis of those samples, 3) outline the analysis performed, and 4) present the final conclusions/recommendations.

SECTION B – DATA GENERATION & ACQUISITION

B.1 Sampling Process Design (Experimental Design)

At least two months of monitoring will occur in Hammond, Indiana (beginning October 2018). This data will be used to determine whether ambient Pb concentrations are above NAAQS levels, to characterize ambient levels of other toxic metals, including manganese, nickel, cadmium, and arsenic for comparison against acute and chronic health benchmarks, and to determine the source(s) of ambient metal concentrations in the local area.

B.2 Sampling Methods

The Xact 625 instrument is a Semi-Continuous instrument that collects and reports data on a 15-minute, 30-minute, 1, 2, 3, or 4-hour increments time scale. For this study, the Xact will be collecting 1-hour samples but can be changed as data become available and if deemed appropriate. The sampling period will be at least 60 days beginning in October 2018. An assessment of the data will determine whether further ambient monitoring is required. Additional monitoring will follow the study design and other procedures outlined in this QAPP. Additional sampling design changes may be made after an assessment of the data. The Project Manager will have the authority to determine if the data are providing adequate information to meet the project objectives.

Site specific meteorological parameters that will be measured consist of wind speed and wind direction. The sonic anemometer is a MET One Instrument Model 50.5 and will be certified annually.

Standard Operating Procedures – the field operators will follow the most recent version of the operation manuals for the Xact instrument.

B.3 Sampling Handling & Custody

The Xact collects and analyzes samples within the same instrument; the user does not touch the filter tape except to load a roll of clean tape and remove a roll of sampled tape. Handling of the filter tape requires no special preparation procedures. The field operator will be responsible for loading and unloading the tape. There are no temperatures or holding time requirements for the Xact samples. For the Xact instrument, there are no sample handling or custody issues. The document “Standard Operating Procedure for the Operation of the Xact Semi-Continuous Metals Monitoring Trailer” is provided in Appendix B.

B.4 Analytical Methods

The Xact system is designed for monitoring ambient air near the fence lines of industrial facilities and in complex urban environments, where particulate matter and metal concentrations are elevated. The system uses reel-to-reel filter tape sampling and nondestructive XRF analysis to monitor ambient air. The air is

sampled through a TSP (or PM₁₀ size-selective inlet) and drawn through a Teflon filter tape. The tape is automatically advanced and analyzed by XRF for selected metals and at the same time the next sample is collected on a clean section of tape. The analysis is based on EPA Method IO 3.3: Determination of metals in ambient PM using XRF (Appendix C).

Table B.2 List of Methods and Target Analytes

Target Analytes	Method
Pb, HAPs Metals, crustal metal elements (Sb, As, Ba, Br, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, K, Rb, Se, Sr, Tl, Th, Ti, Zn)	X-Ray fluorescence
Meteorology	Sonic Anemometry (wind speed and direction vector and scalar data)

B.5 Quality Control

Detailed information on the instruments used in the field can be obtained in the Xact Operations Manual and Standard Operating Procedure for the Operation of the Xact Semi-Continuous Metals Monitoring Trailer in Appendix B.

QC for data collected from the Xact includes an initial calibration check, periodic manual flowrate verifications, periodic manual metals verifications, periodic manual blank tests, automated daily flowrate verifications, automated daily upscale metals verifications for the instrument's mass measurement, and mass sensor stability checks with every sample.

The initial calibration check includes the flowrate system as well as the analysis system according to the operations manual. Additionally, automated flow measurement and upscale metals checks are conducted during a daily 30-minute QC period. The results of these checks will be collected from the Xact by a site operator and placed in a control chart. XRF stability is checked with every sample and results of these checks are also incorporated in a control chart. Details of these procedures may be found in the Standard Operating Procedure for the Operation of the Xact Semi-Continuous Metals Monitoring Trailer in Appendix B and the Xact Operating Manual in Appendix A.

Independent IDEM technical staff will perform at least one audit of the flow measurements during the study period, using independent equipment, of the Xact instrumentation to ensure proper flow measurements are being taken.

The mass sensor stability check is conducted during every sample. For this check, the XRF sensor analyzes a rod with containing a reference value of palladium. The measured mass of palladium must be within $\pm 15\%$ of the reference value of palladium to pass the stability check.

All Measurement Quality Objectives are summarized in the Standard Operating Procedure for the Operation of the Xact Semi-Continuous Metals Monitoring Trailer in Appendix B.

An anticipated schedule for monitoring site activities is provided in Appendix D "Site Visit Schedule for Hammond, IN Xact Project".

B.6 Instrument/Equipment Testing, Inspection, and Maintenance

The site operators will perform routine leak checks and temperature, pressure, and flow rate verification checks using NIST traceable certified standards. If any of these checks are out of specification, the site operators will attempt to correct them or perform the appropriate calibration. If the problem still cannot be resolved, the field manager will contact the vendor for guidance. After any failure, the problem will be investigated and corrective actions will be taken as soon as possible. Following corrective actions, additional checks will be completed and if the sampling instrument meets the acceptance criteria, it will be deemed to be operating properly.

The Xact requires routine maintenance according to the operations manual and its consistency in operation is assured by review and comparison with QC criteria listed in the previous section. As an additional diagnostic tool, field staff will monitor the pressure drop below the filter tape frequently to ensure that the tape is properly in place.

There are several items to inspect in the field before and after ambient air monitoring has begun. There are also many items associated with appropriate preventive maintenance of a successful field program. Please refer to the Xact Operations manual and the Standard Operating Procedure for the Operation of the Xact Semi-Continuous Metals Monitoring Trailer in Appendix C and Appendix B, respectively. The meteorological system will be installed and operated according to the MET One Model 50.5 Wind Sensor operations manual. The Wind Speed and Direction Calibration Forms are in Appendix E.

B.7 Instrument/Equipment Calibration and Frequency

The Xact XRF calibration checks are conducted once prior to monitoring and at least quarterly. This procedure will not need to be repeated during the course of this deployment unless additional monitoring is warranted following the two months of air monitoring or the daily automated metals checks are over 10 % difference. Other calibrations are performed according to the instrument manual and the Standard Operating Procedure for the Operation of the Xact Semi-Continuous Metals Monitoring Trailer in Appendix C and Appendix B, respectively.

B.8 Inspection/Acceptance of Supplies & Consumables

Upon receipt of the Xact sample tape prior to use, field staff will visually inspect the media to look for any damage that may have occurred during shipping. The site operator will also inspect the tape prior to installation at the time each roll is installed in the Xact.

B.9 Data Management

Data generated in the field by the Xact will be collected by the site operator via remote computer access. Data may also be collected directly from the Xact computer in the monitoring trailer. Data will be checked

by Field Operations Manager to ensure they meet the QC standards set forth in this QAPP. Quality-assured data will be put into an EPA-managed Sharepoint data repository accessible only to individuals provided access by the Project Manager. Data will be deposited into the database as locked MS Excel files in .csv format. Additionally, finalized data reports and graphics will be saved to the Sharepoint database. The data repository directory is: Environmental Protection Agency (EPA)\Air Monitoring and Analysis Section (AMAS) - Documents\Xact\Whiting, Metals.

Data will also be shared with IDEM in real time. IDEM will not release data to any external parties until the data has undergone the data validation process by US EPA Region 5 staff.

The QA Coordinator will validate the data, ensuring that the data is valid, and then transfer the data to the Project Manager. The Project Manager will then consolidate the results into a database for analysis. This data and the analysis will be included in the final report as well as other reports and communication products.

SECTION C – ASSESSMENT AND OVERSIGHT

C.1 Assessments and Response Actions

An assessment is defined as an evaluation process used to measure the performance or effectiveness of the quality system or the establishment of the monitoring network and sites and various measurement phases of the data operation. The results of quality assurance assessments indicate whether the control efforts are adequate or need to be improved. Documentation of all quality assurance and quality control efforts implemented during the data collection, analysis, and reporting phases is important to data users, who can then consider the impact of these control efforts on the data quality. In order to ensure the adequate performance of the quality system, the Field Operations Manager will review siting criteria for the metals trailer prior to the beginning of the program and the QA Coordinator will ensure proper QA procedures are in place.

Technical staff have the responsibility to identify problems that could affect data quality or the ability to use data. Any problems that are identified will be reported to the Project Manager who will work with the Quality Assurance Coordinator to resolve any issues. Action will be taken by the Project Manager and appropriate monitoring field staff to identify and address the issue, and to minimize losses and correct data, where possible.

C.2 Reports to Management

The Project Manager will summarize data results at least monthly and will write the final report. The monthly summaries will address performance evaluation and audits, as well as data quality assessments. The final report will consolidate QA findings and address the primary study questions. The Project Manager will provide monthly and final reports to management within U.S. EPA Region 5.

SECTION D – DATA VALIDATION AND USABILITY

D.1 Data Review, Verification, and Validation

Prior to performing any statistical calculations, the reported data from QC checks are reviewed to ensure accurate, sufficient quality data collection was conducted.

Reporting requirements for this project include reporting the pollutant concentration value, wind speed, and wind direction for each measurement. This information will be presented in the final project report.

The final report will include at a minimum:

- Report title
- Name of organization preparing the report
- Name of person or organization receiving the report
- Measurement results
- Name, title, and signature of the supervisor or team leader approving the report

U.S. EPA staff are responsible for all data validation activities for this project. Raw data that is collected and must undergo the full verification and validation procedure including being processed, merged, and flagged in accordance with Table D.1. Raw data that is below the MDLs outlined in Appendix A will be flagged according to the approved SOP. Raw data will also be stored in the data repository.

Table D.3 Xact Monitoring AQS Null Data Codes

Qualifier Code	Qualifier Description	Qualifier Type Description	Qualifier Type	EPA R5 Comments:
6	QAPP Issue	Quality Assurance Qualifier	QA	Operating without an approved QAPP
AM	Miscellaneous Void	Null Data Qualifier	NULL	
AN	Machine Malfunction	Null Data Qualifier	NULL	Communication error; instrument not collecting, data set to null [NA]
AT	Calibration	Null Data Qualifier	NULL	
AZ	QC Audit	Null Data Qualifier	NULL	
BA	Maintenance/Routine Repairs	Null Data Qualifier	NULL	
MD	Value less than instrument detection limit	Null Data Qualifier	NULL	less than negative value of instrument detection limit
ND	No value detected	Quality Assurance Qualifier	QA	
QX	Does not meet QC criteria	Null Data Qualifier	NULL	

D.2 Verification and Validation Methods

At least 10% of the database is checked to verify its validity. Items checked include original data sheets, checks of all calculations (from calibration to sample analysis), and data transfers. As the data are checked, corrections are made to the database as errors or omissions are encountered. If errors are located, all of the data is checked to verify data quality. Documentation of equipment and instrument calibration and other procedures are detailed in the SOPs.

D.3 Reconciliation with User Requirements

Per the DQOs in Section A.7, data will be qualified or nullified if MDLs for toxic metals are not met, according to Table D.1. The Project Manager will conduct a preliminary data review to uncover potential limitations to using the data, to reveal outliers, and generally to explore the basic structure of the data. The first step is to calculate basic summary

statistics, generate graphical presentations of the data, and review these summary statistics and graphs. The Project Manager will calculate statistics for toxic metal data completeness and precision. If data are qualified due to completeness and precision issues, they may still be used for informational purposes.

Appendix A: Xact 625 Ambient Metals Monitor Operation Manual

Appendix B: Standard Operating Procedure for the Operation of the Xact Semi-Continuous Metals Monitoring Trailer

Appendix C: EPA Method IO 3.3: Determination of metals in ambient PM using XRF

Appendix D: Site Visit Schedule for Hammond, IN Metals Monitoring

Appendix E: Wind Speed and Direction Calibration Forms